

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
The Development of Operational, Technical	)	WT Docket No. 96-86
and Spectrum Requirements for Meeting	)	
Federal, State and Local Public Safety	)	
Communications Requirements Through the	)	
Year 2010	)	
To:		The Commission

**COMMENTS OF  
NORTHROP GRUMMAN INFORMATION TECHNOLOGY, INC.**

Northrop Grumman Information Technology, Inc. (“Northrop Grumman”) hereby submits its Comments in response to the *Eighth Notice of Proposed Rulemaking* in the above-captioned proceeding.<sup>1</sup> Northrop Grumman welcomes the Commission’s review of its existing band plan for the 700 MHz public safety spectrum. With the advances in wireless technology and standards since the Commission last visited the matter, “wideband” has become an obsolete concept for public safety users. In place of the existing band plan accommodating “wideband” services for public safety, the Commission should adopt a new band plan and accompanying service rules fully supporting broadband services for public safety users, as detailed below. In addition, Northrop Grumman urges the Commission to consider a broader scope of modifications within the Upper 700 MHz band to eliminate further spectral inefficiencies and minimize the potential for interference within and between the public safety and commercial portions of the band.

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<sup>1</sup> *Eighth Notice of Proposed Rulemaking*, WT Docket No. 96-86, 21 FCC Rcd 3668 (2006) (“NPRM”). A summary of the *NPRM* was published in the Federal Register on April 7, 2006, 71 Fed. Reg. 17786.

## **I. Introduction**

Northrop Grumman Information Technology, Inc., a wholly-owned subsidiary of Northrop Grumman Corporation, is a leading provider of IT, systems engineering and systems integration for the Department of Defense, national intelligence, federal civilian and state and local agencies, and commercial customers. For more than 50 years, Northrop Grumman has been helping public sector organizations build and operate IT systems that support government's critical missions of delivering services and protecting citizenry, providing unbiased engineering and vendor-neutral integration of best-of-class technologies and products from the marketplace. Northrop Grumman is a leader in public safety systems and one of the world's largest suppliers of 911 First Responder Computer-Aided Dispatch systems, as well as a major presence in homeland security initiatives as the number one provider of security solutions to the federal government. Northrop Grumman deploys next-generation secure broadband wireless networks and interoperable voice communications solutions for defense, intelligence, and public safety organizations, and has supplied more than 30,000 mobile data units to law enforcement agencies nationwide.

## **II. The “Wideband” Segments of the Band Plan Are Obsolete and Should Be Modified to Support Fully Broadband Services**

The Commission “has long recognized that in order for public safety entities to successfully carry out their missions, ‘they must rely on a forward-looking spectrum policy that promotes beneficial technological advances into their communications systems.’”<sup>2</sup> As voiced with near unanimity among the parties filing *ex parte* comments in this proceeding since the Commission’s last *Report and Order*,<sup>3</sup> and as the Commission itself has found, “emergency

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<sup>2</sup> *Id.* at ¶ 24, quoting *First Report and Order and Third Notice of Proposed Rulemaking*, WT Docket No. 96-86, 14 FCC Rcd 152, 166 ¶ 22 (1998).

<sup>3</sup> *Fifth Memorandum Opinion and Order, and Sixth Report and Order, and Seventh Notice of Proposed Rulemaking*, WT Docket No. 96-86, 20 FCC Rcd 831 (2005).

response providers would benefit from development of an integrated, interoperable network capable of delivering broadband services nationwide.”<sup>4</sup> The benefits of broadband wireless services for public safety are manifest. Broadband wireless can support mobile use of highly advanced applications of great benefit to public safety users, including elements such as real-time, full-motion video, high resolution images and graphics, rapid access to large data files and myriad other features and functions that will be developed, or harnessed from the commercial world, operating on Internet Protocol and other platforms.<sup>5</sup>

In contrast, the scope of applicability of “wideband” is limited, particularly outside of the public safety sector. Only a small number of technology vendors, primarily manufacturers of legacy land mobile radio equipment with an interest in protecting market share, are exhibiting any interest in or support for providing “wideband” wireless networks, whether via the Scalable Adaptive Modulation (SAM) / TIA-902 wideband data interoperability standard, or any other standard. It is at best a niche technology with a small vendor community, lacking the large potential customer base and market scale necessary to yield low cost network equipment and user devices such as exists in the commercial wireless equipment market. Adoption of such a limited technological base will also inflict upon public safety entities the continuing opportunity cost of estrangement from future innovation in commercial wireless technology centered on broadband. From an applications standpoint, “wideband” capabilities are merely a subset of the

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<sup>4</sup> *NPRM* at ¶ 3, citing *Report to Congress on the Study to Assess the Short-Term and Long-Term Needs for Allocations of Additional Portions of the Electromagnetic Spectrum for Federal, State, and Local Emergency Response Providers*, WT Docket No. 05-157 (Dec. 16, 2005) (“Report to Congress”) at 13 ¶ 26.

<sup>5</sup> For example, Northrop Grumman has delivered fully secure, high-speed, Internet Protocol-based broadband wireless solutions to numerous federal, state and local public safety agencies that enable the convergence of data, voice and video onto one network, with full interoperability across disparate communications systems. Effective law enforcement requires “anytime, anyplace” access to federal, state and local government databases. Specifically, field personnel need immediate, bandwidth-intensive information such as license and vehicle registration details, felony warrant data, and fingerprint biometrics in an ultra-secure environment, with full mobility. Similarly, first responders such as fire fighters need fast access to key data such as maps, utility information, building plans, hazardous materials and biomedical information, and other life safety information from numerous data sources. With Northrop Grumman’s broadband solutions, law enforcement personnel and first responders exchange secure information “on the move” via handheld and wearable devices, tablet PCs, and laptops.

capabilities of broadband, and “wideband” applications (images, limited data and slow scan video) can always be delivered by broadband. But broadband commercial wireless technologies offer improved capabilities, efficiencies,<sup>6</sup> capacity and throughput, and interoperability, provide a competitive environment for network deployment and device procurement, and offer the promise of access to future commercial innovations that can be leveraged by public safety users.

For these reasons, Northrop Grumman urges the Commission to eliminate channelization of the public safety band for “wideband” and modify the band to provide for the fullest possible extent of broadband wireless service, consistent and compatible with the transmission technologies and standards that have evolved for commercial broadband wireless. It is vital that 700 MHz public safety spectrum be provided for broadband purposes, as this spectrum is ideally suited for this purpose, providing distance and mobile propagation and building penetration vital to public safety applications, whereas the 4.9 GHz public safety band does not have these important characteristics. The most technologically appropriate and flexible manner of structuring the band plan for broadband is to create broadband channels that are 1.25 MHz wide, as Lucent advocates.<sup>7</sup>

Northrop Grumman believes that the 700 MHz public safety band can be improved to maximize possibilities for broadband wireless and capture optimal spectrum efficiency, while preserving the amount and usability of the narrowband channels. The current band plan for 700 MHz public safety, as well as for the adjacent A and B Guard Band Blocks of commercial

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<sup>6</sup> Lucent Technologies (“Lucent”) points out that many commercial broadband standards enjoy considerably greater efficiency through spectrum reuse. *NPRM* at ¶¶ 20-21. According to Lucent, SAM / TIA-902 has a frequency factor of greater than 12, inasmuch as channels cannot be re-used in neighboring cells. *See ex parte* letter from Michael T. McMenamin, Esq., Lucent, to Marlene H. Dortch, Secretary, Federal Communications Commission WT Docket Nos. 96-86 and 05-157 (dated Nov. 10, 2005) at 10. By contrast, Code Division Multiple Access 2000 (CDMA 2000) can re-use the same channels in adjacent cells/sectors, so its frequency reuse factor is 1. *Id.* This greater spectrum efficiency will simplify the coordination process by the 700 MHz Regional Planning Committees (RPCs).

<sup>7</sup> *See NPRM* at ¶¶ 20-22. Among its many proposals, the National Public Safety Telecommunications Council (“NPSTC”) also advocates use of 1.25 MHz channels for broadband channels. *See id.* at ¶ 18.

spectrum, was developed when the timing of access to the 700 MHz public safety spectrum was uncertain.<sup>8</sup> The Commission separated the narrowband channels into two blocks of paired channels, on spectrum occupied by four television broadcast channels now in use.<sup>9</sup> Distributing the narrowband channels over two different sets of television channels created the prospect of earlier access by public safety to some of the narrowband channels, if the television stations impacting one of those pairs of television channels in a given location were required to vacate earlier than television stations affecting the other television channel pair.

This benefit from the current band plan became moot, however, when the clearing mechanism for television stations occupying the Upper 700 MHz band was changed in 2005. Now all television stations are required to vacate the Upper 700 MHz band by the same fixed date.<sup>10</sup> Since earlier access to public safety narrowband spectrum is no longer a meaningful benefit,<sup>11</sup> there is no need for the narrowband channels to be bifurcated into two paired blocks -- and no longer need to encumber portions of that spectrum with limited usefulness in order to protect these two paired blocks (four blocks total) of narrowband spectrum.

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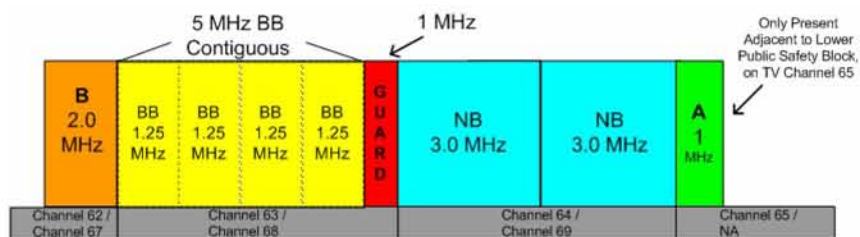
<sup>8</sup> Until recently, federal law provided that completion of the transition of television broadcasting stations from analog to digital operation (and the resulting clearing of television stations from the Upper 700 MHz band) was subject to the timing of the consumer marketplace, as to when digital television reception penetration reached an 85% benchmark in each of the local television markets in the U.S. 47 U.S.C. § 309(j)(14) (2004). Thus the timing of future availability of a particular portion of the spectrum in a given area was uncertain. Moreover, in many cases it would be dependant on the benchmark having been reached in multiple local television markets.

<sup>9</sup> One of the pairings of narrowband channel blocks, NB-1 (base) and NB-2 (mobile), was designated for portions of the spectrum now occupied by television channels 63 and 68, respectively. The other pairing, NB-3 (base) and NB-4 (mobile), was designated for spectrum now part of television channels 64 and 69, respectively.

<sup>10</sup> Television stations now must complete their transition from analog to digital transmissions (including cessation of their operations in the Upper 700 MHz band) by February 17, 2009. *See NPRM* at ¶ 2, *citing* Pub. L. No. 109-171, 120 Stat. 4 (2006), § 3002(a).

<sup>11</sup> It is possible that the present plan's bifurcation of narrowband pairings (onto different television channel pairs) could create additional present access to narrowband channels, compared to a band plan where narrowband is located in a single paired block. However, any such increases in availability are clearly not meaningful, as almost all the 700 MHz public safety spectrum remains encumbered by television station operations, especially in urban areas where the pressing need exists for additional narrowband public safety spectrum. *See, e.g., Report to Congress* at 6 ¶ 6, 24-25 ¶¶ 54-58; *Reply Comments of NPSTC* in ET Docket No. 05-24, filed May 2, 2005, at 3. The significant benefits to public safety of the changes discussed herein vastly outweigh any existing benefit of earlier access to narrowband spectrum in those limited areas.

Given these changed circumstances, Northrop Grumman urges the Commission to modify the 700 MHz public safety band plan to combine the narrowband channels into a single paired block, eliminating the existing spectral inefficiencies while at the same time increasing the spectrum available for public safety broadband wireless services. Northrop Grumman proposes that the narrowband channels be located at the top end of the 700 MHz public safety band pair, with a one MHz guard band located immediately below it, separating it from the balance of the public safety spectrum modified to support broadband wireless technologies, as shown in Figure I:



**FIGURE I – 5 MHz Broadband Contiguous (4 - 1.25 MHz Channels), Consolidated Narrowband Channels**

Consolidating the narrowband channels in this manner will not negatively affect the deployment and use of the narrowband channels, because meaningful deployments on the narrowband channels have yet to occur.<sup>12</sup>

Reconfiguring the 700 MHz public safety band this way will greatly advance development and deployment of broadband wireless services for public safety users. Increasing the spectral efficiency of the band by eliminating the need to protect the second narrowband channel block will free sufficient spectrum to allow four contiguous broadband channels of 1.25 MHz each, enabling flexible use (through aggregation of the channel blocks) of an array of

<sup>12</sup> Regional plans developed thus far by RPCs may have to be amended. However, as of the issuance of the *NPRM*, only eight regional plans had been filed with the Commission, and only four of those had been approved by the Commission, out of a total of 55 regions. *NPRM* at ¶ 25 n. 81 and 82, ¶ 35. The Commission itself can minimize or eliminate any impact of modifying the public safety band plan by taking prompt action in this proceeding including, as discussed below, consideration of all aspects of the plan being advanced by the Guard Band Licensees for improving the Upper 700 MHz band.

commercially-available broadband technologies, including those utilizing a 5 MHz channel bandwidth. Northrop Grumman urges that the Commission adopt such a plan.

Northrop Grumman also urges that public safety users be permitted to aggregate the 1.25 MHz channels into larger blocks of contiguous spectrum to allow flexibility to use multiple standards, as local and regional needs and arrangements dictate.<sup>13</sup> Allowing aggregation of as much as 5 MHz of contiguous spectrum enables the use, for example, not only of the CDMA 2000 standards referenced by Lucent, but also the Universal Mobile Telecommunications System (UMTS) Wideband CDMA (WCDMA), UMTS Time Division-CDMA (TD-CDMA) and IEEE 802.16 WiMAX standards, as well as future versions of the 3G CDMA (1xEV-DO) and FLASH-OFDM (Orthogonal Frequency Division Multiplex) standards. As urged by NPSTC and others, the RPCs are best suited to administer the licensing of broadband channels, including aggregation of channels, to meet the individual needs of diverse communities.<sup>14</sup>

Modifying the band plan as described above to replace “wideband” channels entirely with broadband will effectively eliminate the need for any mandated interoperability standard (and any need to retain any wideband channels merely for the sake of interoperability). This issue will essentially solve itself, through the evolution of commercial broadband wireless and network standards, and by virtue of the IP-based design of networks, with new standardized layers now being used commercially such as IP Multimedia Subsystem (IMS).<sup>15</sup> In addition, the robust adaptability of the latest broadband wireless user equipment, with software-defined characteristics, will provide imbedded interoperability.

Public safety broadband wireless systems should be subject to rules restricting out-of-band emissions (an emissions mask) for broadband operation at 700 MHz, in lieu of the adjacent

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<sup>13</sup> Among others, NPSTC also advocates the ability to aggregate 1.25 MHz channels into a wider channel. *See id.* at ¶ 18.

<sup>14</sup> *Id.*

<sup>15</sup> For example, Northrop Grumman’s wireless solutions offer full interoperability across disparate communications systems via its Internet Protocol-based system.

channel power (ACP) mechanism in place now for wideband systems. This method of regulating interference is used successfully by the Commission in other broadband wireless bands, such as the 4.9 GHz public safety band,<sup>16</sup> the Broadband Radio Service (BRS) and Educational Broadband Service (EBS) in the 2.5 GHz band,<sup>17</sup> and the Wireless Communications Service (WCS) in the 2.3 GHz band.<sup>18</sup> Northrop Grumman urges that the Commission adopt a similar regulatory structure for the 700 MHz public safety broadband wireless service.<sup>19</sup>

### **III. The Commission Should Broaden the Scope to Consider Other Possible Improvements to the Upper 700 MHz Band**

The Commission should be lauded for its willingness to review and re-think the 700 MHz public safety band, to capture the benefits of broadband wireless technology. However, Northrop Grumman urges the Commission to consider a bigger picture of potential improvements in the Upper 700 MHz band that can further enhance 700 MHz public safety spectrum usage, while at the same time improving the efficiency of commercial spectrum in the Upper 700 MHz band. The return of much of the B-Block Guard Band spectrum by Nextel Communications, Inc.<sup>20</sup> creates a unique opportunity for improvements in the Upper 700 MHz band, by various potential modifications of the commercial spectrum, notably the A and B Guard Band Blocks.

A plan now being advanced by Access Spectrum, L.L.C. and others (the “Guard Band Licensees”) will significantly improve the spectral efficiency, protection and usefulness of the public safety band, while also improving the utility of the Guard Band spectrum. Similar to

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<sup>16</sup> See 47 C.F.R. § 90.1215.

<sup>17</sup> See 47 C.F.R. § 27.53(l) *et seq.*

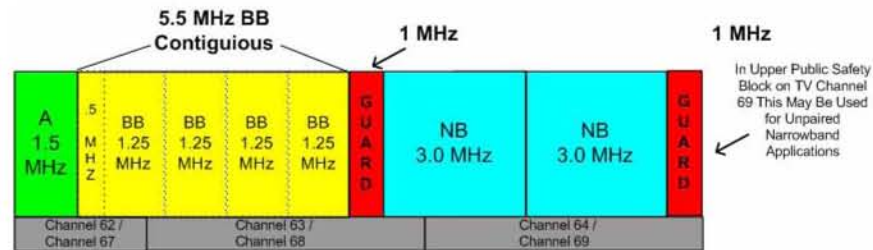
<sup>18</sup> See 47 C.F.R. § 27.53(a) *et seq.*

<sup>19</sup> Northrop Grumman does not believe it is necessary for the Commission to specify a standard data rate per bandwidth for public safety broadband wireless systems. Public safety users, and the RPCs planning and coordinating their usage of broadband wireless channels, will have the ability and incentive to adopt broadband wireless technologies that are spectrally efficient.

<sup>20</sup> See *NPRM* at ¶ 34, *citing Improving Public Safety Communications in the 800 MHz Band* in WT Docket No. 02-55, *Report and Order*, 19 FCC Rcd 14969, 15080 ¶¶ 208-209 (2004); *Improving Public Safety Communications in the 800 MHz Band* in WT Docket No. 02-55, *Supplemental Order*, 19 FCC Rcd 25120, 25126 ¶ 8 (2004).



Northrop Grumman’s proposal discussed above, the Guard Band Licensees advocate that the present narrowband public safety spectrum be combined into one block located at the top end of the 700 MHz public safety band, creating four 1.25 MHz channels. Their plan would surround this combined narrowband block on both sides by a one MHz guard band within the public safety band, to ensure narrowband protection, as shown in Figure II:



**FIGURE II – 5.5 MHz Broadband Channel (4 - 1.25 MHz Channels, + 0.5 MHz), Consolidated Narrowband Channels, A/B Merge**

To accomplish this, the Guard Band Licensees propose that the Commission contribute three MHz of the B Block to public safety<sup>21</sup> increasing the 700 MHz public safety band pairing from a total of 24 MHz (12 MHz pair) to 27 MHz (13.5 MHz pair). The remaining one MHz of the B Block would become part of the A Block, and the A Block would be moved to be adjacent to the lower end of the public safety block, placing similar and potentially compatible broadband wireless operations adjacent to each other, for the benefit of both from an interference and coordination perspective. Much of the roughly 10 MHz of spectrum in the Upper 700 MHz band<sup>22</sup> now encumbered with limited usefulness to protect the current narrowband channel plan could instead be put to constructive use.

The Commission has taken note of filings by the Guard Band Licensees and states in the *NPRM* that “the reallocation issues raised by...Access Spectrum/Pegasus are beyond the scope

<sup>21</sup> Motorola has also proposed re-allocation of some of the B-Block spectrum. See *NPRM* at ¶ 34.

<sup>22</sup> This 10 MHz hampered by protection requirements includes spectrum both in the 700 public safety band (used essentially as guard bands to protect narrowband from anticipated “wideband” uses), as well as spectrum in the adjacent A and B Guard Band Blocks of commercial spectrum in the Upper 700 MHz band that are required to protect the public safety narrowband channel blocks.

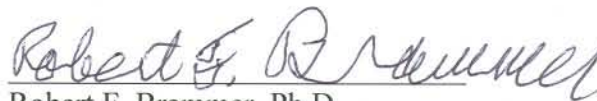
of this proceeding; and we will address them in a separate rulemaking.”<sup>23</sup> Northrop Grumman believes that the latest proposal of the Guard Band Licensees has great merit, and urges the Commission either to widen the scope of this rule making to review the entirety of the proposal, or to launch expeditiously an appropriate proceeding to ensure that all elements of the proposal are entertained contemporaneously with the instant rule making. Undeniably, the issues raised by the proposal are of great import to and impact upon band planning issues central in this proceeding, and they must be considered along with the issues raised by the Commission in the NPRM.

#### **IV. Conclusion**

The Commission can realize the opportunities for advanced services, improved spectrum efficiency, and ongoing technological evolution by modifying the 700 MHz public safety band plan to provide for broadband operations in lieu of the outdated “wideband” channelization. Northrop Grumman urges the Commission to modify its rules as set forth above.

Respectfully submitted,

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<sup>23</sup> *Id.*